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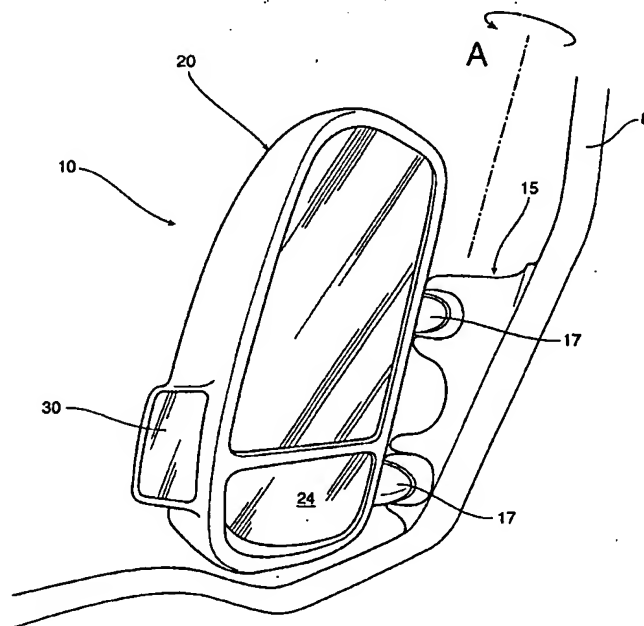
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[Continued on next page]

(54) Title: **FOLDABLE VEHICLE EXTERNAL MIRROR HAVING AUXILIARY MIRROR**



(57) Abstract: A vehicle external mirror assembly (10) comprising a bracket mountable to a vehicle door (8), a mirror head (20) pivotally mounted to the bracket (15), a main rear view mirror (22) mounted to the head (20), and an auxiliary mirror (30) mounted to the head (20). The auxiliary mirror (30) provides the vehicle driver with vision alongside and behind the vehicle when the mirror head (20) is in a folded position.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

FOLDABLE VEHICLE EXTERNAL MIRROR HAVING AUXILIARY MIRROR

The present invention relates to vehicle external mirror assemblies and in particular, relates to assemblies where the mirror head is movable between a deployed position and a parked or folded position.

BACKGROUND

External rear view mirrors (wing mirrors) fitted to modern cars (automobiles) often form the widest part of the vehicle. The heads of these mirrors are usually designed to rotate about a vertical pivot axis both forwards and backwards. Generally a detent mechanism is provided to hold the mirror head in its operable position. The ability to fold or park a mirror head is provided for a number of reasons including to allow effective reduction in the width of the vehicle and to reduce the risk of impact on pedestrians or other vehicles. Furthermore, when vehicles are transported on trucks or trains, it is useful to be able to fold or park mirror heads.

When a mirror head is in a parked or folded position, the mirror is positioned substantially parallel to the vehicle's side or at least is not at an angle suitable for providing the vehicle driver with vision along side and behind the vehicle. This can present a problem particularly when it is necessary for a driver to reverse a vehicle when the mirror is in this condition. For instance, it may be necessary for a driver to reverse a vehicle having a parked mirror head into a car wash, into a parking area, into a narrow garage or onto a loading truck.

It is an object of the present invention to provide a vehicle external mirror assembly that overcomes or at least ameliorates the above problem.

SUMMARY OF THE INVENTION

Broadly, according to a first aspect of the invention, there is provided a vehicle external mirror assembly comprising:

a bracket mountable to a vehicle;
a mirror head pivotally mounted to the bracket, the mirror head movable between a deployed position and a folded position;
a main rear view mirror mounted to the head, the main mirror positionable to provide rear vision to the vehicle driver when the mirror head is in the deployed position; and
an auxiliary mirror mounted to the head,
wherein the auxiliary mirror provides the vehicle driver with vision along side and behind the vehicle when the mirror head is in the folded position.

Preferably, the auxiliary mirror has a convex face providing a wide field of rear view to the vehicle driver.

Preferably the auxiliary mirror is movable with respect to the mirror head. This allows the vehicle driver to adjust the auxiliary mirror so as to obtain optimum vision alongside and behind the vehicle when the mirror head is in its folded position.

According to a second aspect of the invention, the auxiliary mirror of the mirror assembly is pivotally mounted with respect to the mirror head. The auxiliary mirror is movable relative to the mirror head from a stowed position to at least one deployed position. Detent means may be provided to selectively hold the auxiliary mirror in the stowed position and at least one deployed position.

An actuator may be provided to drive the auxiliary mirror between the stowed position and the at least one deployed position.

According to a third aspect of the invention, the external mirror assembly further comprises a single support that supports both the auxiliary mirror and the main mirror.

Preferably the support is movably mounted to the mirror head so as to allow adjustment of the angular position of the support with respect to the mirror head.

Specific embodiments of the invention will now be described in some further detail with reference to and as illustrated in the accompanying figures. These embodiments are illustrative and are not meant to be restrictive of the scope of the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

Preferred embodiments of the invention are illustrated in the accompanying representations in which:

Figure 1 shows a perspective view from a driver's position of a vehicle external mirror assembly in accordance with a first embodiment of the invention;

Figure 2 shows a perspective view from a driver's position of a vehicle external mirror assembly in accordance with a second embodiment of the invention;

Figure 2a shows a diagrammatic sectional view through section lines 2-2 as shown on Figure 2.

Figure 2b shows a diagrammatic sectional view through section lines 2-2 as shown on Figure 2 but with the auxiliary mirror in a deployed position.

Figures 2c and 2d show diagrammatic sectional views similar to those of Figures 2a and 2b, but also shows a motor mechanism.

Figure 3 shows a perspective view from a driver's position of a vehicle external mirror assembly in accordance with a third embodiment of the invention; and

Figure 4 shows the vehicle mirror assembly of Figure 3 in a deployed (normal in use) position as viewed from the rear of the vehicle.

Figure 5 shows the mirror assembly of Figure 4 with an alternative mirror mounting arrangement.

Figure 6 shows a perspective view from a driver's position of a vehicle external mirror assembly in accordance with a fourth embodiment of the invention.

Referring to Figure 1, a vehicle mirror assembly 10 is mounted to the door 8 of a vehicle. The vehicle mirror 10 comprises a bracket 15 mounted to the door 8, a mirror head 20 connected to bracket 15 by a pair of arms 17. The mirror head is pivotally mounted to the bracket by virtue of attachment of arm 17 to bracket 15 in such a way as to allow a degree of rotation about axis A as indicated in Figure 1.

In Figure 1 the mirror head is shown in its parked or folded position, substantially parallel to the vehicle's side. In this position, the mirror head protrudes minimally from the side of the vehicle. This minimises the chance of the mirror striking an object and is useful for loading the vehicle onto transport trucks amongst other things. In this position however, the main mirror 22 and spotter mirror 24 (where fitted) are not useable to provide rear vision because of their unsuitable angular positions. An additional mirror 30, referred to as an auxiliary mirror throughout this specification, is fixed to the outside edge of the mirror head 20 as shown in Figure 1. This auxiliary mirror is arranged and constructed so as to provide the vehicle driver with rear vision when the mirror head 20 is in the folded position shown in Figure 1. Although the position of auxiliary mirror 30 is not adjustable with respect to the mirror head 20 with this particular embodiment of the invention, a convex reflecting surface is provided to give a wide field of view.

In an alternative arrangement shown in Figures 2, 2a and 2b (refer section lines 2-2 in Figure 1), the auxiliary mirror 30 is mounted on a backing plate 34 that is mounted by a pivot 32 to the mirror head 20. With this second embodiment of the invention, the auxiliary mirror can be folded in to the stowed position shown in Figure 2a for reduced drag, reduced vehicle width and for protection against impact damage. The folded out or deployed position is shown in Figure 2b. A finger gripable de-latch lip 36 is provided to assist with deployment. Detents 38, shown in Figure 2b, allow the auxiliary mirror 30 to be deployed in several positions providing alternate rear view fields of view for the driver. This allows the driver to adjust the auxiliary mirror 30 so as to obtain optimum vision along side and behind the vehicle when the mirror head 20 is in the folded position.

Figures 2c and 2d show a motor mechanism 40 having a gear 42 that drives the auxiliary mirror 30 outwards and inwards using a rack 44. Various other arrangements may be used.

Figure 3 shows a third embodiment of the invention wherein the auxiliary mirror 30 and spotter mirror 24 are integral (that is, they are one). An advantage of this arrangement is that adjustment of the angle of the mirror surfaces 24 and 30 can be achieved by a single mirror actuator assembly.

Figure 4 shows the mirror of Figure 3 in a deployed position in which the main mirror 22 functions as the primary rear view mirror for the vehicle. The spotter mirror 24 provides a wider field of view. This is achieved by providing the spotter mirror 24 with a convex reflecting surface.

Figure 5 shows the mirror assembly of Figure 4 with an alternative mirror mounting arrangement in which separate mirrors 30 and 24 are supported by a single integral support in the form of a backing plate 26.

Figure 6 shows an alternative embodiment of the invention without a spotter mirror. With this embodiment, the main mirror 22 and auxiliary mirror 30 are integral. Again, an alternative arrangement is to have separate mirrors 22 and 30 on a single backing plate similar to the arrangement shown in Figure 5.

The mirror assemblies shown in Figures 2 to 6 can either be simply manually movable between their deployed and parked/folded positions or can include an actuating mechanism for such movement. Likewise, the mirror or mirrors can either be manually movable with respect to the mirror head 20 or can have actuating mechanisms for movement.

In an alternative embodiment of the invention (not illustrated), a mechanical link is provided between the auxiliary mirror pivoting mechanism and the main mirror pivoting mechanism, thus allowing the auxiliary mirror to be automatically shifted between its parked and deployed position as the main mirror head is folded or driven between its deployed and parked position.

The embodiments described above, with reference to the drawings, have dual arms 17 between the bracket 15 and the head 20. Other embodiments, not shown, may include single arm arrangements or mirror assemblies where the arm is virtually eliminated, with the bracket and head being only separated to the extent necessary to allow relative pivotal movement.

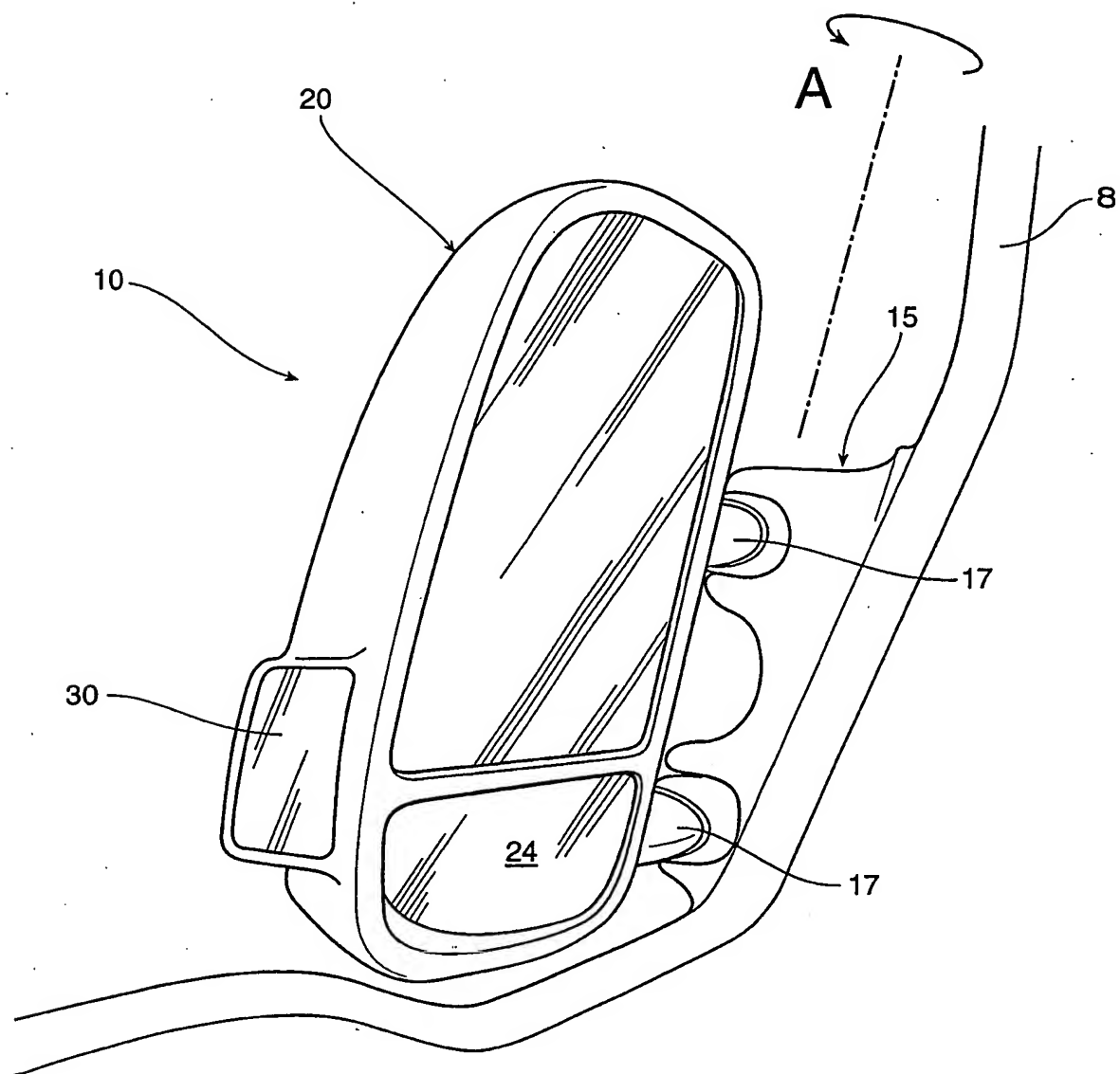
While the present invention has been described in terms of preferred embodiments in order to facilitate better understanding of the invention, it should be appreciated that various modification can be made without departing from the principles of the invention. Therefore, the invention should be understood to include all such modifications within its scope.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A vehicle external mirror assembly comprising:
 - a bracket mountable to a vehicle;
 - a mirror head pivotally mounted to the bracket, the mirror head movable between a deployed position and a folded position;
 - a main rear view mirror mounted to the head, the main mirror positionable to provide rear vision to the vehicle driver when the mirror head is in the deployed position; and
 - an auxiliary mirror mounted to the head,wherein the auxiliary mirror provides the vehicle driver with vision along side and behind the vehicle when the mirror head is in the folded position.
2. A vehicle external mirror assembly as claimed in claim 1 wherein the auxiliary mirror has a convex face.
3. A vehicle external mirror assembly as claimed in claim 2 wherein the auxiliary mirror is movable with respect to the mirror head.
4. A vehicle external mirror assembly as claimed in claim 3 wherein the auxiliary mirror is pivotally mounted with respect to the mirror head.
5. A vehicle external mirror assembly as claimed in claim 4 wherein the auxiliary mirror is movable relative to the mirror head from an stowed position to at least one deployed position.
6. A vehicle external mirror assembly as claimed in claim 5 further comprising a detent means to selectively hold the auxiliary mirror in the stowed position and in the at least one deployed position.

7. A vehicle external mirror assembly as claimed in claim 6 wherein the auxiliary mirror further comprises a gripable portion, the gripable provided to facilitate manual movement of the auxiliary mirror between the stowed and the at least one deployed position.
8. A vehicle external mirror assembly as claimed in claim 7 wherein the detent means selectively holds the auxiliary mirror in a plurality alternate deployed positions.
9. A vehicle external mirror assembly as claimed in claim 5 further comprising an actuator to drive the auxiliary mirror between the stowed position and the at least one deployed position.
10. A vehicle external mirror assembly as claimed in claim 9 wherein the actuator drives the auxiliary mirror between the stowed position and a range of deployed positions, thereby allowing a vehicle driver to vary the field of view provided by the auxiliary mirror.
11. A vehicle external mirror assembly as claimed in claim 2 further comprising a single support that supports both the auxiliary mirror and the main mirror.
12. A vehicle external mirror assembly as claimed in claim 11 wherein the support is movably mounted to the mirror head so as to allow adjustment of the angular position of the support with respect to the mirror head.
13. A vehicle external mirror assembly as claimed in claim 2 further comprising a secondary mirror having a wider field of view than that of the main mirror, the secondary mirror positionable to provide rear vision to the vehicle driver when the mirror head is in the deployed position.

14. A vehicle external mirror assembly as claimed in claim 13 further comprising a single support that supports both the auxiliary mirror and at least one of the main and auxiliary mirrors.
15. A vehicle external mirror assembly as claimed in claim 14 wherein the support is movably mounted to the mirror head so as to allow adjustment of the angular position of the support with respect to the mirror head.
16. A vehicle external mirror assembly as claimed in any one of claims 1 to 15 wherein the auxiliary mirror is positioned on a side of the mirror head distal from the bracket.

**Fig 1**

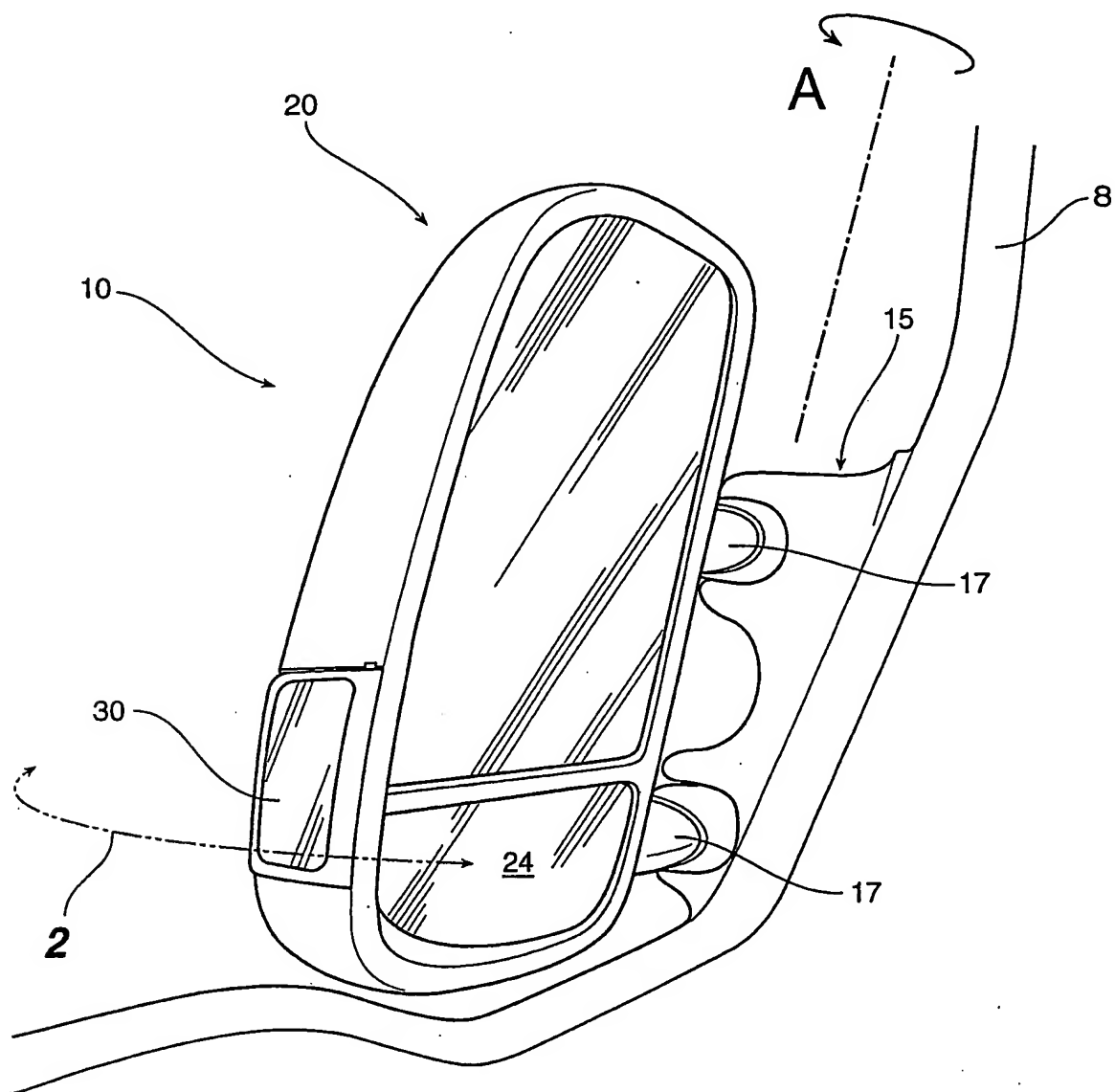
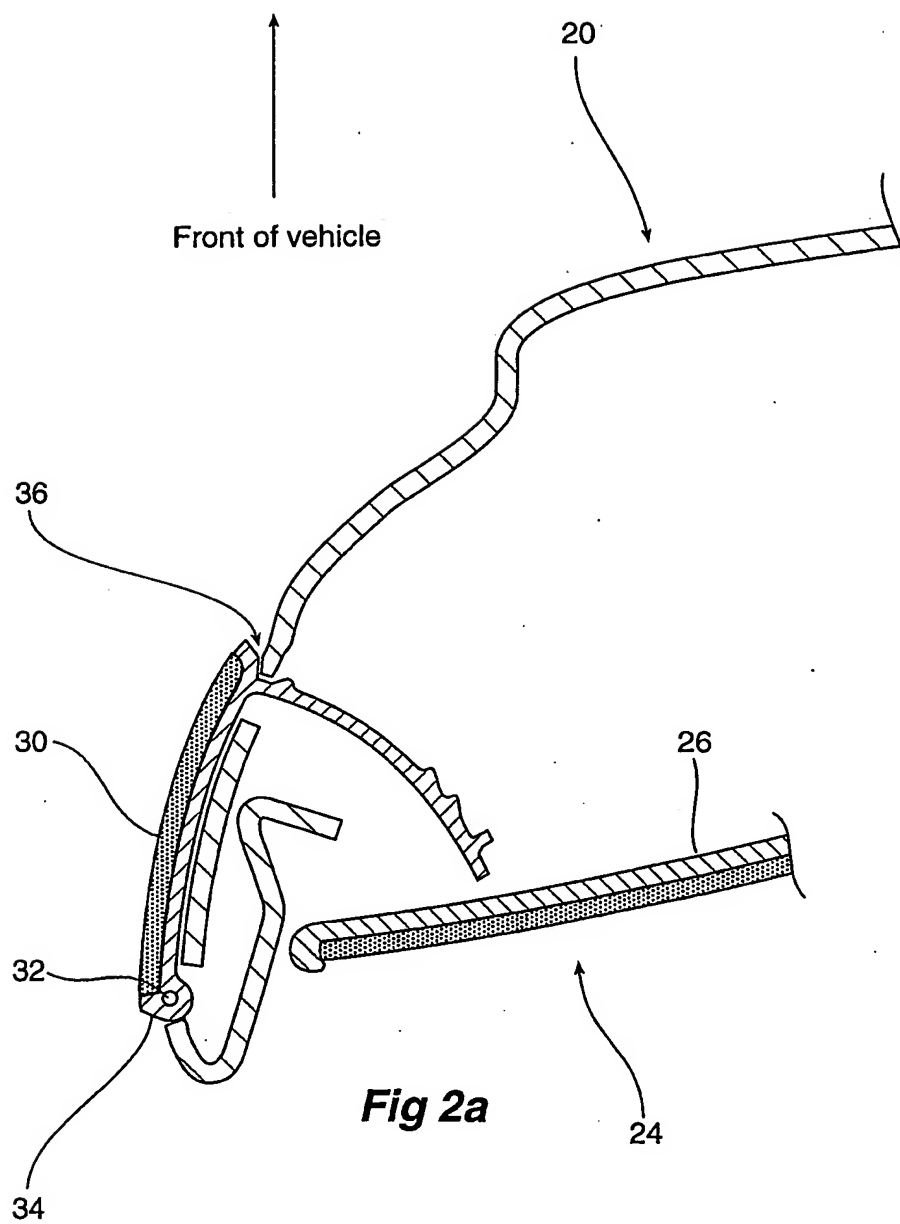
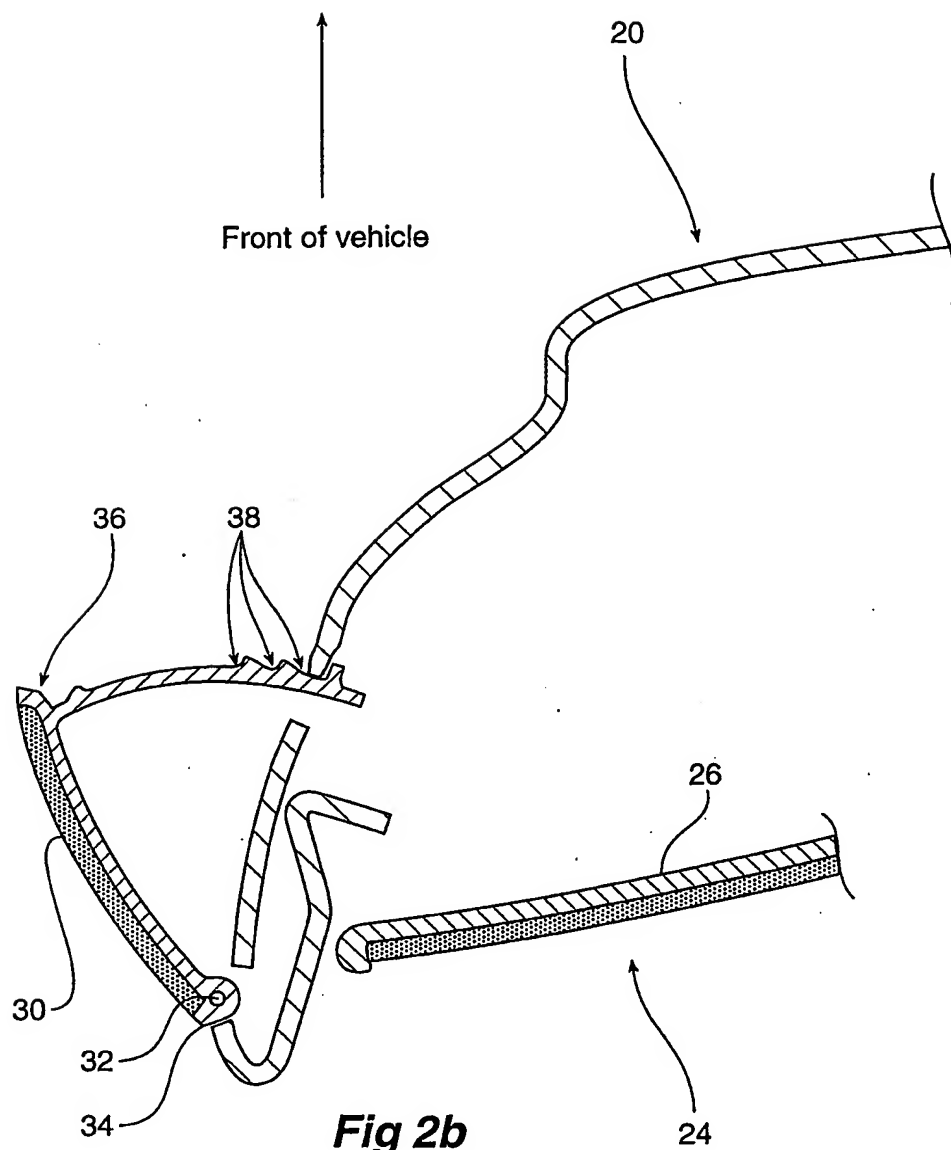
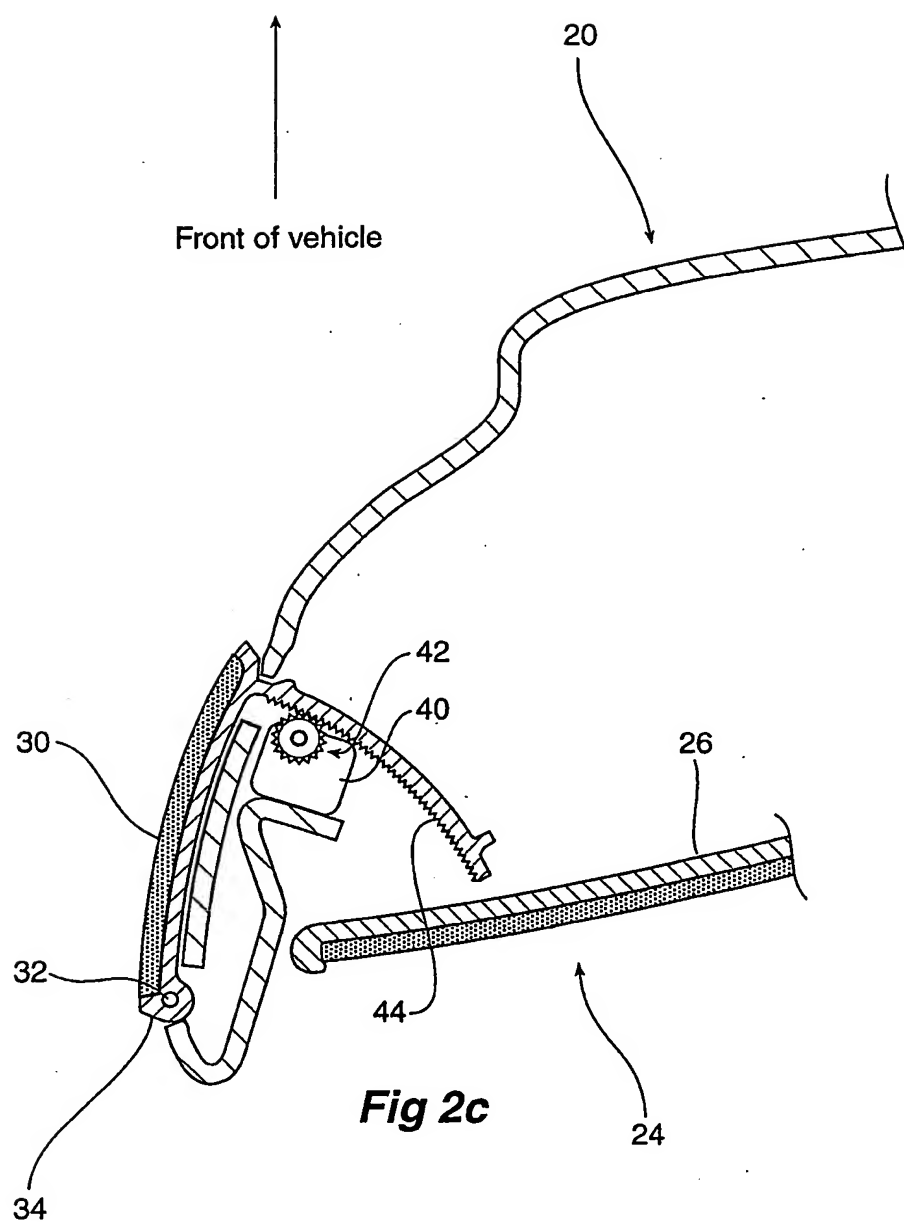
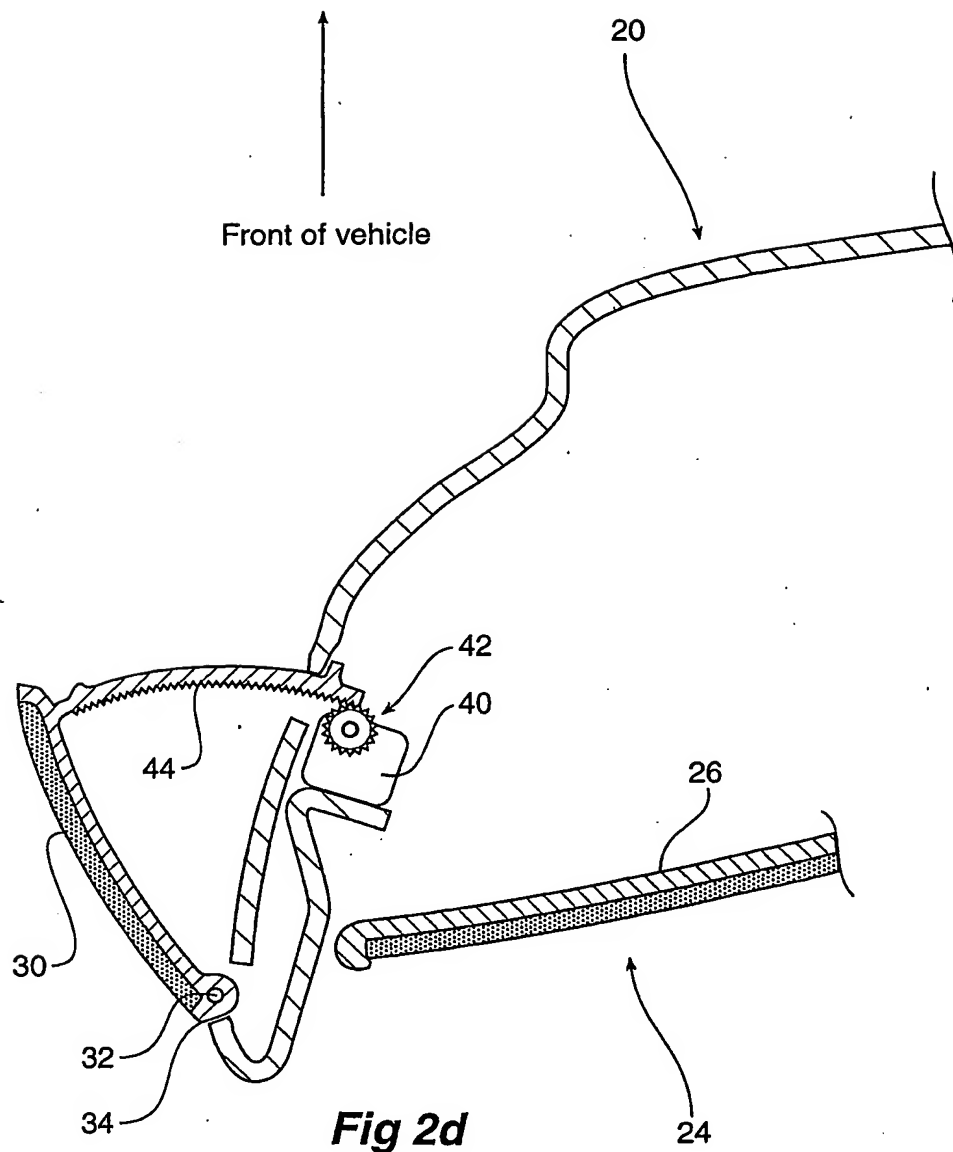


Fig 2

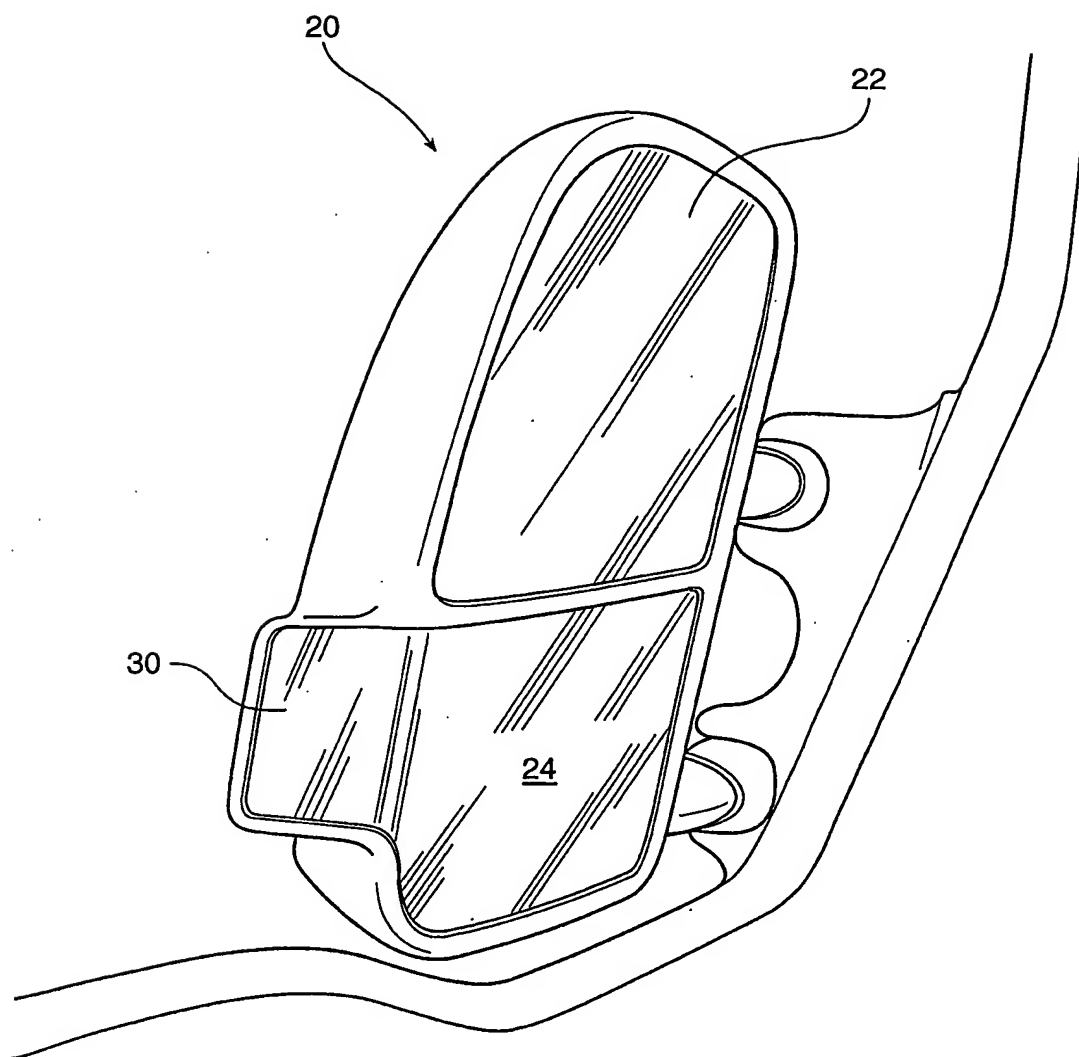


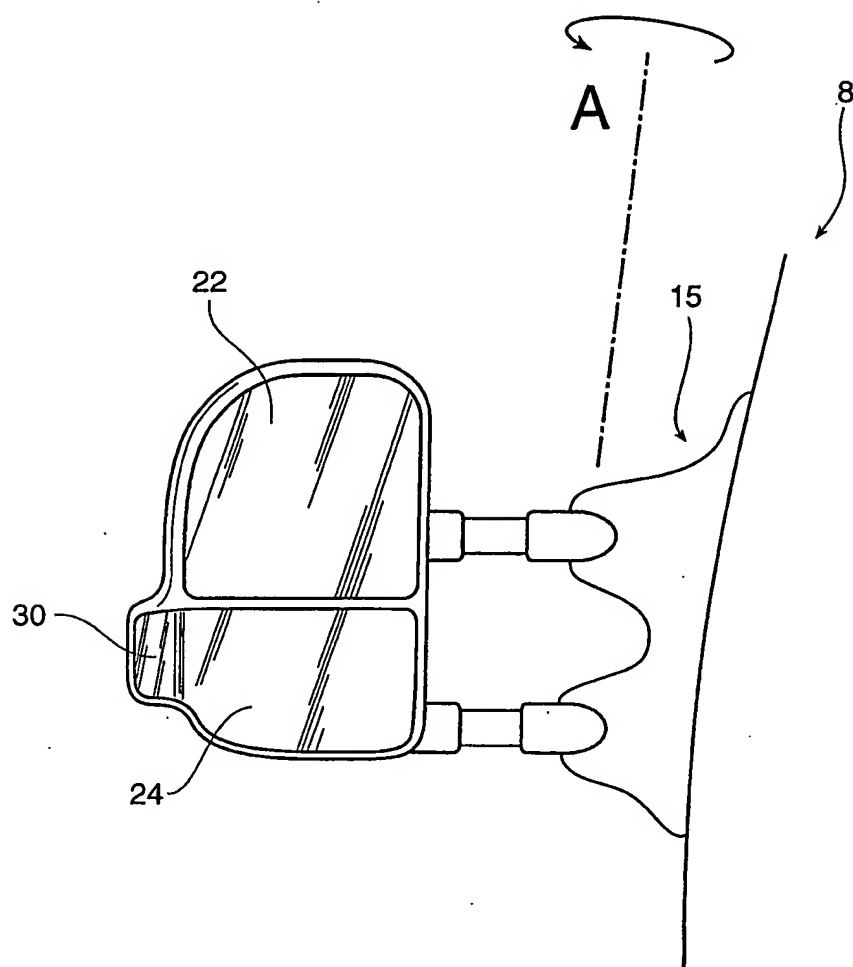






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**Fig 3**

**Fig 4**

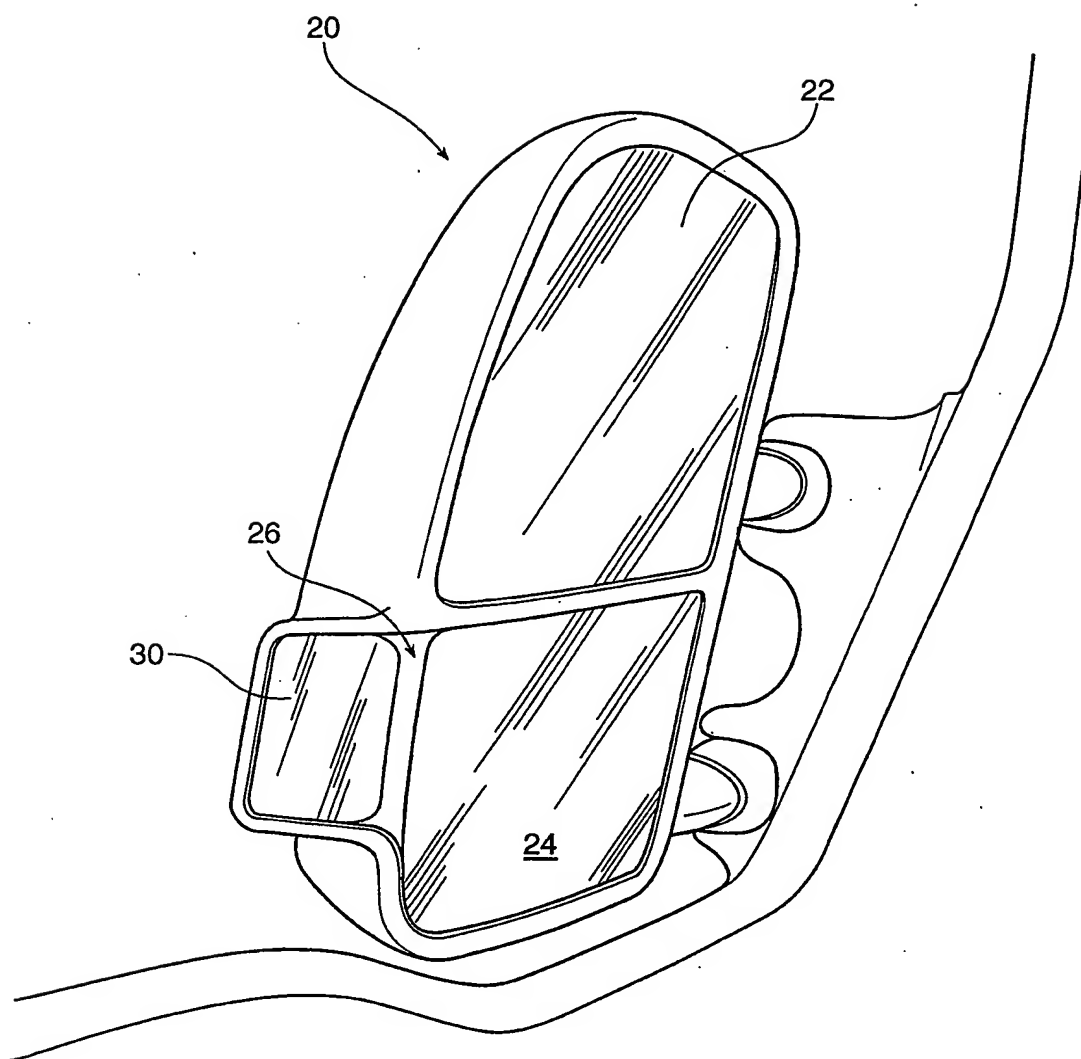


Fig 5

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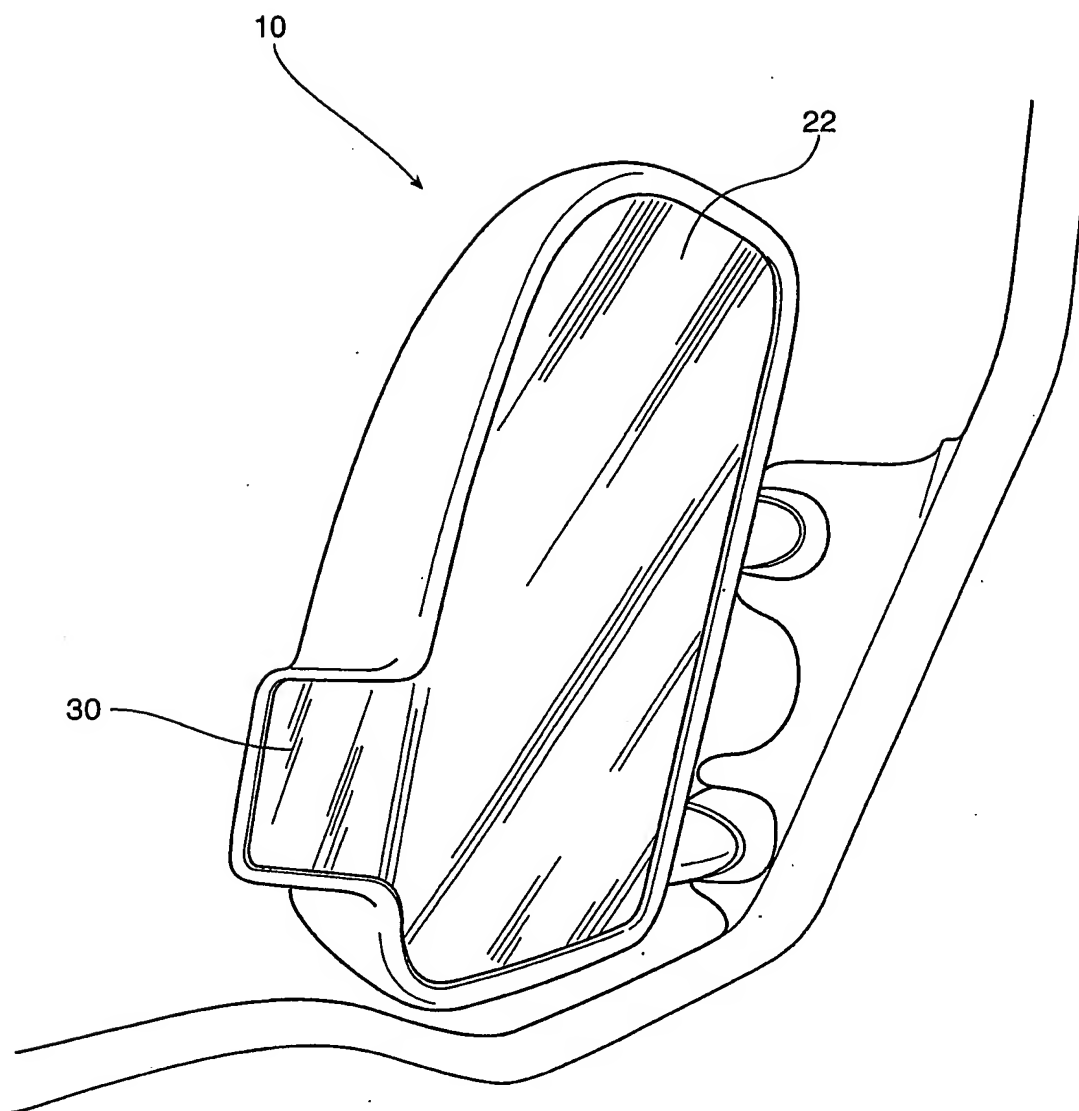


Fig 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU02/01004

A. CLASSIFICATION OF SUBJECT MATTERInt. Cl. ⁷: B60R 1/074, 1/072

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DWPI: IPC B60R 001/IC, G02B 005/IC and key words PARK etc., AUXILIARY etc.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2200609 A (JAGUAR CARS LIMITED (Incorporated In United Kingdom)) 10 August 1988 Whole document	1-16
X	DE 3839322 A (BAYERISCHE MOTOREN WERKE AG) 23 May 1990 Whole document	1



Further documents are listed in the continuation of Box C



See patent family annex

* Special categories of cited documents:

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search

9 August 2002

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/AU02/01004

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member	
GB	2200609	US	4829379
			END OF ANNEX